

# EMERGING ISSUES AND NEW TECHNOLOGIES IMPACTING NATIONAL METEOROLOGICAL & HYDROLOGIC SERVICES

## *International Session*

*7 February 2003*

On 7 February 2003, the U.S. National Weather Service organized a special international session that preceded the American Meteorological Society Annual Meeting in Long Beach, CA. The purpose of the International Session was to address emerging issues and new technologies that impact National Meteorological and Hydrologic Services (NMHSs). One of the intended outcomes of this meeting was to provide the attendees with an enhanced understanding of the broad issues that affect services in all countries and potential solutions to the future challenges.

There were six invited presentations covering the five discussion areas described below. A question and answer period followed each speaker and a group overview/discussion was held after all the presentations were completed.

### **Discussion Areas**

The session and corresponding discussions focused the topics outlined below.

- 1) ***Emerging Global Issues that Impact the Future of NMHSs:*** Topics included – weather prediction and the use of weather data; the global water crisis and the role of NMHSs in minimizing economic disruption and maximizing water utilization; climate change: new operations and modeling technologies; and partnerships between NMHSs, the private sector, and academia. These topics provided an overview of critical issues that impact NMHSs and the new technologies that exist to respond to new challenges.
- 2) ***Weather Prediction and the Use of Weather Data:*** This topic addressed the use of new weather technologies, elaborated the importance of international cooperation, and examined the benefits of modeling, visualization techniques and other technologies that will shape the future of NMHSs.
- 3) ***The Global Water Crisis:*** The primary topic was how NMHSs will meet the new demand on NMHSs created by the water crisis issue. Concerns addressed included - increasing magnitude and frequency of hydrologic extremes such as floods and droughts (and the fact that this has a greater impact on society than in the past) , dwindling water supplies for many countries in the world, and lowering availability of water supplies due to pollution and contamination.
- 4) ***Climate Change:*** Discussions in this area included how new operations and modeling technologies enhance the understanding of climate variability and the impacts on

society in various sectors such as water management. Additional topics included development and dissemination of climate products to decision makers to improve conditions in climate-sensitive sectors as well as coordination of data exchange, field observations, and scientific research, and capacity building internationally.

- 5) **Partnerships** – The importance of partnerships and consortiums between the NMHSs and the private sector and academia as the NMHSs improve their capacity to address emerging weather, water, and climate issues was discussed. Specific topics noted included how partnerships can be used to share resources and responsibilities and help foster improvements in capabilities not otherwise possible and involvement of the user community as a partner/stakeholder with the NMHSs.

## **Presentations**

Presentations were provided by the following invited speakers.

### **Title**

*Emerging Global Issues that Impact the Future of National Meteorological and Hydrologic Services*

### **Presenter**

Dr. John W. Zillman, Director  
Bureau of Meteorology, Australia  
President, World Meteorological Organization

### **Overview**

Dr. Zillman emphasized that NMHSs and the WMO community are now operating in a geopolitical environment that is characterized by such difficult issues as economic globalization, foreign and homeland security, global poverty eradication and international trade in services; and such complex social and public policy considerations as trust, equity and blame; as well one which requires their much deeper involvement with such legal and administrative matters as competition law, intellectual property protection, quality certification and performance management and reward. This presentation drew together some of the key results of recent work on these issues and outlined the essential elements of a robust strategy for the future development of NMHSs and their relationship with the academic, media and meteorological and hydrological private sectors within the framework of the WMO.

---

### **Title**

*Weather Prediction and the Use of Weather Data: The Future of Climate and Weather Prediction & the Role of National Meteorological and Hydrologic Services*

### **Presenter**

Dr. David Burridge, Director  
European Centre for Medium-Range Weather Forecasts, United Kingdom

**Overview**

Dr. Burridge discussed the state of numerical weather prediction (NWP) and seasonal modeling, including – existing accuracies and skill, sources of errors, and examples of model simulations. He pointed out that we can expect continued improvement in the quality of NWP and seasonal forecasts as well further applications of forecast outputs to address evolving societal needs and the development of new products. This can be expected due to improvements in data assimilation (e.g., better use of satellite data and improved ground-based observing systems), more robust numerical methods, and stronger computing capabilities.

---

**Title**

*Global Water Crisis: Role of Hydrologic Services in Minimizing Economic Disruption and Maximizing Water Utilization*

**Presenter**

Dr. Soroosh Sorooshian, Regents Professor and Director  
NSF Science and Technology Center on “Sustainability of Semi-Arid Hydrology and Riparian Areas”, University of Arizona

**Overview**

Dr. Sorooshian provided an in-depth discussion of the worldwide water crisis and the stresses on water resources. The discussion included topics on availability, water quality impacts, dam failures, and climate change and variability uncertainties. He discussed meteorological modeling and their accuracies and the consequent impacts on hydrologic assessments. A strong message was – Water resources planning cannot be done effectively without reliable hydrologic and meteorological information. Relative to this, he emphasized the need to exploit new sources of data and to implement new hydrologic and meteorological modeling tools for water resources planning. He also stressed the importance of better coordination between the hydrologic and meteorological and climate programs at international agencies such including WMO.

---

**Title**

*Climate Change: New Operations and Modeling Technologies*

**Presenter**

Dr. Ants Leetmaa, Director  
NOAA Geophysical Fluid Dynamic Laboratory, Princeton, New Jersey

**Overview**

Dr. Leetmaa discussed how the 21<sup>st</sup> century will present new challenges to the NMHSs. He indicated that the confluence of increasing populations, concentrated in mega-cities, with a changing climate presents increases the necessity for a broader range of more accurate forecasts with increasing lead times. NMHSs must be able to provide forecasts relevant to food and energy security, health, and natural hazards. New seasonal

forecasting capabilities predict deviations from normal seasonal climatologies out to a year in advance while climate change scenarios project possible future changes to seasonal climatologies and perhaps to weather extremes. He emphasized that challenges ahead include developing new modeling capabilities and products that address societal needs (e.g., food and energy security, health) and to work together to accelerate this process.

---

**Title**

*Public-Private Partnerships – Challenges and Opportunities: Role of National Meteorological and Hydrologic Services*

**Presenter**

Mr. Hiroyoshi Ishibashi, Group Chairman & CEO.  
Weathernews Inc., Japan

**Overview**

Mr. Ishibashi's presentation focused on building a new model for developing partnerships between the public and private sectors in meteorology and hydrology. His very animated presentation compared the old and new concepts of partnerships between the two sectors and highlighted the evolution of the weather business partnership in Japan. Mr. Ishibashi described new partnership paradigms and emphasized that closer partnerships are needed between the public and private sectors in order to satisfy the growing demand for meteorological and hydrologic services.

---

**Title**

*Public Partnerships Working with Academia in Research: Role of National Meteorological and Hydrologic Services*

**Presenter**

Dr. John Snow, Dean  
College of Geosciences, University of Oklahoma

**Overview**

The theme of Dr. Snow's presentation was partnerships between the private sector and universities. He stressed the need for the private sector and universities to approach weather related research and development needs as partners. In this partnership, the universities can provide the private sector with resources, facilities, and an entrepreneurial spirit while the private sector must provide the funding, data, internships for students and professional opportunities for university staff. Various contractual and other mechanisms for building these relationships and the challenges to do so were outlined.

---

## Discussion Summary

A question and answer and discussion period was held after each presentation. A final, group discussion period was also held at the end of the session. Some of the key topics are provided below.

- A key theme was the strengthening of the NMHSs, especially those in developing countries. It was agreed that WMO has the framework needed to work on strengthening the services and should do so. To do this, regionalization was strongly promoted by the group as a way to optimize global meteorological and hydrologic resources especially to assist those countries with minimal resources and capabilities. There should be regional centers for environmental prediction (modeling centers) and regional centers to coordinate global operational observing systems – one of the reasons being that many users need regional information and data not global.
- It was noted that NMHSs are willing to exchange forecasts and those with forecasting capabilities to provide forecasts for those that do not have the capability – consequently a fair exchange would be for those that do not have resources to forecast to assist by providing quality controlled input data or do model validation. In addition, organizations like the ECMWF have training programs on model use and data requirements, these programs could help the developing country NMHSs but funding is needed to provide this support.
- Free and open exchange of data was discussed at length. Free exchange is an important element of the services provided by the NMHSs though some believed free exchange should be limited and not expanded. Several participants noted that the word “free” can have a negative implication in that users may believe that “you only get what you pay for”. In addition, NMHSs should be careful when defining the goals of cost recovery for data or products – each should look at the viability of the market and that the real value of the NMHS is in the data ‘brokering’ marketplace. An important conclusion was there should be a reasonable compromise between free and open data and the charging for data access.
- Forecast models are constantly improving. Resolution may double in the next few years but still will not be down to the scales needed for forecasting local, severe weather events. The availability of satellite data enhances model accuracy but data management issues occur, it is necessary to start doing analyses for the optimum way to access and apply the large amounts of satellite data that are becoming available.
- It was agreed that public-private relationships are important for both parties and can provide “win-win” scenarios. Once a private sector company determines the needs of its customer, it can (and should) negotiate/mediate with the public sector to obtain the data it needs (perhaps even agree to divide certain processing costs for example). An alternative as in Japan is the development of a Business Support Center to be the interface between the government agency and the private company to determine data requirements and associated costs.

- As for the academia-private relationships, the biggest issue was how representative the relationship model that exists in the developed countries (as discussed by Dr. Snow) would be in the developing world – the biggest issue being that universities then compete with government agencies. It was stated that in many developing countries this would not occur, as universities are not allowed to participate with the private sector. It was noted that generally, universities are only involved in research-oriented activities and not in operations.
  - A short discussion was held on the impacts of technology. The conclusion was that sometimes technology advances more quickly than our (e.g., operations, users) ability to use it. We should advance and provide users with what is necessary dependent on needs and requirements.
  - There still is a major global issue on the users believing and trusting forecasts. This level of trust (or distrust) varies around the world.
  - It was agreed that change is currently occurring at a great pace – specifically for the types of services required, the context of these services and the level of collaboration between users and providers. Changes are occurring due to improvements in technology and globalization (which brings on additional market pressures). For some changes, the NMHSs have no or little control over what is occurring. NMHSs need to begin to realize that there is a new “connectiveness” and many things are now connected (much like the ocean and the atmosphere) This too is a change that must be recognized.
  - Currently in the WMO, the users and providers do not carry the same weight as the NMHSs. WMO should begin a process to even this out with the emphasis starting on the users and should include the private sector. In the future the PRs should represent their own agencies and the users and all other national organizations. WMO must continue to foster public-private relationships (discussions indicated the WMO recognizes this need and has begun to do so).
-